Prince Sultan University
Orientation Mathematics Program
MATH 002
Midterm Examination
Semester II, Term: 072
Saturday, March 29, 2008
Time Allowed: 100 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

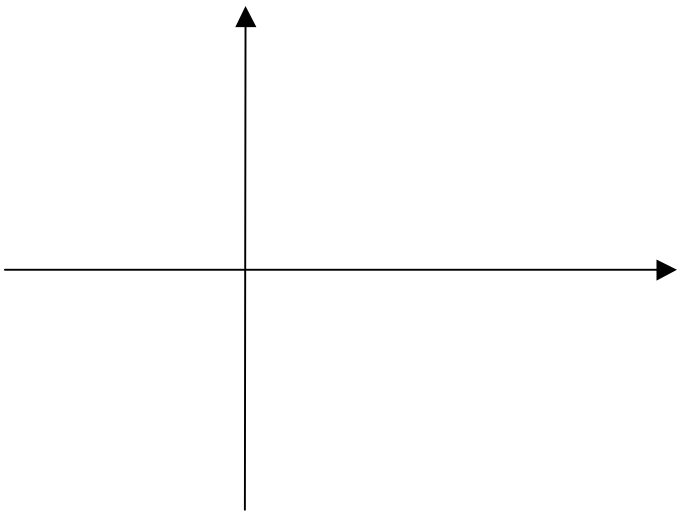
Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 18 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3	15	
4,5,6,7	19	
8,9,10	22	
11,12,13	17	
14,15,16	14	
17,18	13	
Total	100	

Provide an organized complete solution for each Question

Q1. (5 points) Graph the function $f(x)=\left(\frac{1}{3}\right)^{x-1}-2$ in the rectangular coordinate system. (**Plot at least 3 points on the graph**)



Q2. (5 points) Approximate each expression using a calculator. (**Round** your answer to three decimal places)

a. $-3e^{-3}=$

b. $\log\left(\sqrt{3}-1\right)=$

c. $\tan 25^{\circ}=$

d. $\cos 2.5=$

e. $\csc\frac{\pi}{5}=$

Q3. (5 points) The formula $f(x)=80e^{-0.5x}+20$ describes the percentage of information that a particular person remembers x weeks after learning the information. Find approximately the number of weeks if the percentage of information remembered is 31.

Q4. (**3 points)** Find the domain of $f(x) = 2x - 1 + \ln(5x - 3)$

Q5. **(5 points)** A circle has a radius of 4 inches. An arc of length 15 inches is intercepted by a central angle θ . Find the angle θ in degrees. (**Round** your answer to two decimal places)

Q6. **(6 points)** Solve the logarithmic equation: $\log_6(x+5) + \log_6 x = 2$

Q7. **(5 points)** Expand the logarithmic expression as much as possible $\log_3 \sqrt[3]{\frac{x^2 y}{2+x}}$

Q8. (5 points) Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1.

$\frac{1}{2}\left[\log_5 x + \log_5 (x^2 - 1) - \log_5 (x + 2)\right]$

Q9. (12 points) Solve the following equations: (Then use a calculator to find the answer correct to three decimal places)

a. $7^{x+2} = 410$

b. $5^{x^2-12} = 25^{2x}$

Q10. (5 points) If θ is an acute angle with $\csc\theta = 3$ and $\cot\theta = 2\sqrt{2}$, find the **exact** value of the remaining trigonometric functions of θ.

Q11. (5 points) A tower that is 125 feet tall casts a shadow 172 feet long. Find the angle of elevation of the sun to the nearest degree.

Q12. (9 points) Use reference angle to find the **exact** value of the following: (**Do not use a calculator and show your work**):

a. $\sec 510^\circ$

b. $\cot\left(\frac{17\pi}{6}\right)$

c. $\cos(-225^\circ)$

Q13. (3 points) Use a calculator to find the value of the acute angle θ in **radians**, of $\cos\theta = 0.123$. (**Round** your answer to three decimal places)

Q14. (3 points) let $P(\frac{-5}{13}, \frac{-12}{13})$ be the point on the unit circle that is corresponding to a real number t . Find the **exact** value of $\tan t$

Q15. (5 points) Use a right triangle to write the expression as an algebraic expression of x . Assume that x is positive and in the domain of the given inverse trigonometric function

$$\csc\left(\cos^{-1} x\right)$$

Q16. (6 points) Use a sketch to find the **<u>exact</u>** value of $\sin\left(\tan^{-1}\frac{-7}{24}\right)$

Q17. (**3 points)** Find the range of $f(x) = 1 + 3\sin x$

Q18. **(10 points)** Determine the amplitude, period and the phase shift. Then graph **<u>two periods</u>** of

$$y = 3\cos\left(x + \frac{\pi}{2}\right)$$